Python Loops and Lists

Week 3

For Loop

- A loop is when a block of code is repeated a number of times. There is usually a condition that will end the loop. For example, a block of code might be executed 4 times.
- The For statement is one statement that is used with loops.

```
for i in range(10):
    print(i)
```

- Note: The variable i is commonly used as it represents initialize (to start)

Range() function

- The range() function is used to generate a sequence of numbers, incrementing (increasing) by 1. The default starting point is 0.
- For example:

```
for i in range(5):
    print (i)
```

Output:

```
0
1
2
3
4
```

range(start, stop)

The range () function can be assigned starting (included) and ending (not included) parameters.

For example:

```
for i in range(5, 10):
   print (i)
```

Output:

```
5
6
7
8
9
```

range(start, stop, step)

The range () function can be assigned starting, ending and stepping parameters.

For example:

```
for i in range(4, 16, 2):
  print (i)
```

Output:

```
4
6
8
10
12
14
```

What numbers will the following generate?

`range(10)`	0, 1, 2, 3, 4, 5, 6, 7, 8, 9
`range(7,11)`	7, 8, 9, 10
`range(3,15,3)`	3, 6, 9, 12

For Loop

- A for loop can be used to perform calculations a number of times.

```
for i in range(10):
    num = i + 1
    times_four = num * 4
    print(times_four)
```

Why did we not use:

```
for i in range(10):
    times_four = num * 4
    print(times_four)
```

Lists (Arrays)

Constructing a List

- Lists are containers that hold words or numbers.
- A list can be a sequence of data values called items. Lists can contain strings, integers and also variables”
- For example a list of subjects:

```
subjects = [‘Maths’, ‘Chemistry’, ‘Computing’, ‘Physics’]
```

- A list is named (subjects) and items of the list are enclosed in square brackets separated by commas.

Zero Indexed

- Lists are zero indexed

```
subjects = ['Maths', 'Chemistry', 'Computing', 'Physics']
```

Index	0	1	2	3
Item	Maths	Chemistry	Computing	Physics

```
print(subjects[2])
```

- List elements can be accessed by using an index number

Adding to a list

- Append method
  - Adds elements to the end of the list.

```
subjects.append('English')
print(subjects)
```

Index	0	1	2	3	4
Item	Maths	Chemistry	Computing	Physics	English

Removing elements/items from a list

- remove method
  - The remove method uses the item.

```
subjects.remove('Chemistry')
```

Index	0	1	2	3
Item	Maths	Computing	Physics	English

Removing and returning items from a list

Index	0	1	2	3
Item	Maths	Computing	Physics	English

- pop method
  - The pop method uses the index.

```
phys = subjects.pop(2)
print(phys)

Output: Physics
```

After using pop()

Index	0	1	2
Item	Maths	Computing	English

Finding the number of items in a list

Index	0	1	2
Item	Maths	Computing	English

- len function
  - The len function displays the number of items in a list.

```
print(len(subjects))
```

Output: 3

Looping with lists

Index	0	1	2
Item	Maths	Computing	English

- The for loop can be used to loop through lists

```
for i in subjects
        print(i)
```

Output:

```
Maths
Computing
English
```

Sorting a list

Index	0	1	2
Item	Maths	Computing	English

- The sort method will sort the list ascending

```
subjects.sort()
print(subjects)
```

Output:

```
['Computing', 'English', 'Maths']
```

Exercise

- Create a list named animals containing: Lion, Dragon, Monkey, Panda.
- Add a new animal : Tiger
- Sort the list.
- Print out the list using a for loop.
- Use the pop method to delete the 3rd item/element.
- Print out the length of the list.
- Print out the list using the print function.

```
Output:
Dragon
Lion
Monkey
Panda
Tiger

4

['Dragon', 'Lion', 'Monkey', 'Tiger']
```

Answer

```
animals = ['Lion', 'Dragon' , 'Monkey' , 'Panda']
animals.append('Tiger')
animals.sort()
for i in animals:
    print(i)

animals.pop(3)
print(len(animals))
print(animals)
```

Quiz

- Complete the CAP Term 2 Lecture 3 – Python QUIZ

Next Lecture

- Turtle